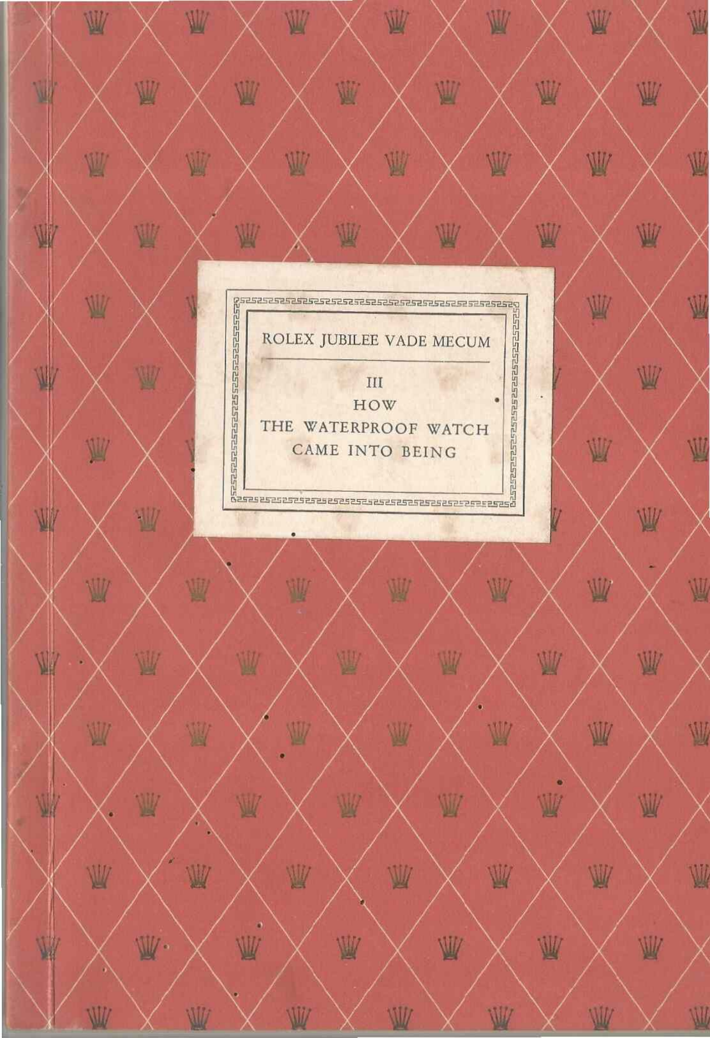


ROLEX JUBILEE VADE MECUM

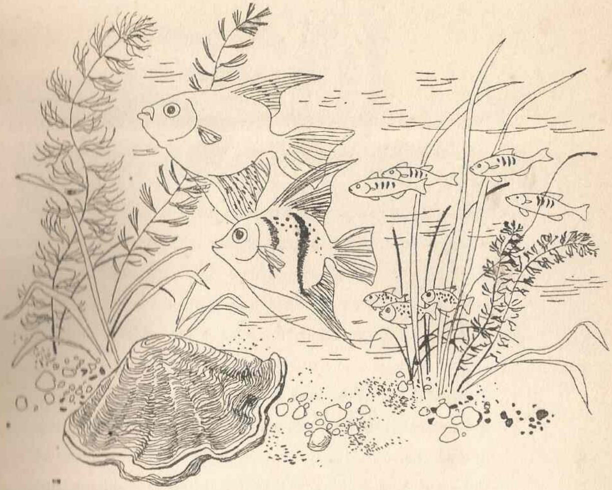
III

HOW THE WATERPROOF WATCH CAME INTO BEING

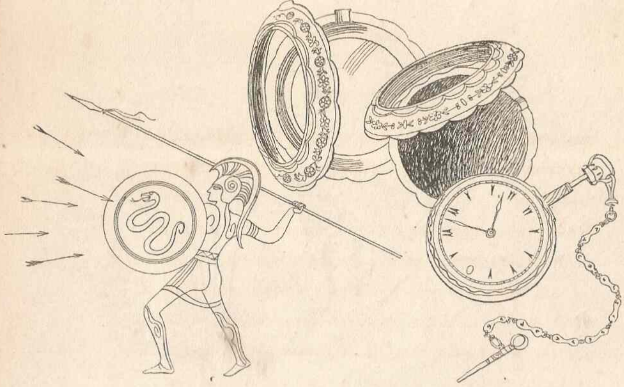
III

HOW THE WATERPROOF WATCH CAME INTO BEING

Published by Rolex Watch Co. Ltd., Geneva.
Written in collaboration with Messrs. Alfred Chapuis, Dr. honoris causa of the University of Neuchâtel, and Eugène Jaquet, formerly Principal of the Geneva School of Horology.
Translated by R. Grandvoinet. Illustrations by Hans Tomamichel.
Printed in Switzerland. Fretz Bros. Ltd., Zurich.
Copyright 1946 by Rolex Watch Co. Ltd., Geneva.



Ever since the watch came into being, men have always sought to protect its outer shell, often composed of precious stones and metals, and even more its essentially delicate mechanism. In early days, when watch glasses were unknown, the dial was safeguarded by a cap; later, sheaths, boxes or double, triple and even quadruple cases—such as those used for certain pieces intended for sale in the Near East—were devised to preserve the beauty and accuracy of case and movement.



However, just as the human body long remained defenceless against its most perfidious enemy, the invisible army of microbes only lately discovered by medical science, so the watch had only its shell to guard it against shocks, and nothing at all to save it from dust and humidity, foes which slyly attacked the movement, impairing its accuracy and sometimes causing irreparable damage.

In our modern world, the human body is better protected against the onslaught of microbes and bacteria; similarly, the watch has now a defence, the waterproof case.

The dictionary tells us that "waterproof" means "impervious to water; impermeable; that which does not permit the passage of fluids". This may lead us to imagine that the inventor's intention in constructing the waterproof watch was merely to provide a watch which could be used by swimmers and deep-sea divers—surely a rather restricted use.

We have seen mermaids used to illustrate advertising matter for the waterproof watch. Or again, many of our readers will remember the bowls of gold-fish containing a watch which suddenly appeared in jewellers' window displays in the year 1927. If stress has always been laid on the imperviousness to *water* of this new type of watch, it is because the public is usually more aware of the danger this element presents for a watch movement and it is also

a danger perhaps easier to illustrate. "Facts are stubborn things", said the author of Gil Blas—and here was a fact no one could deny.

But, if the waterproof case can protect a watch from water and humidity, it certainly can also protect it against dust, which is just as dangerous.

Dust penetrates everywhere and quickly forms a thick, oily coat. If you do not really believe this, lift the bezel of the glass of a non-waterproof watch or examine the hinges of a pocket watch. You will be most surprised to see how much dirt and dust is found there, especially if the watch has been rather neglected. In the old days, when pocket watches held pride of place, dealers always recommended that waist-coat pockets should be cleaned out regularly, in view of protecting the watch from dust—but who could remember this irksome task!

Dust was the only danger pocket watches or even ladies' brooch or necklace watches had to face. With the coming of the wristlet watch, however, another problem had to be met. The busy man for instance, often neglects to remove his watch before washing his hands. He does not realize that drops of water will inevitably be sprinkled over it. Now, these drops will penetrate into the watch through

the crown and into the movement through the winding stem. In this way, watches are damaged, sometimes beyond repair, especially if their owner has spent a holiday by the sea where his watch has come into contact with sand, most detrimental to the movement. These impurities also greatly affect the oil which plays such an important part in the wheel-work, its action being comparable to that of the synovia (a secretion of the joint cavities) on the joints of the human body.

In the field of modern industry, the problem of the waterproof watch has preoccupied inventors for more than fifty years.. Early attempts to protect watch movements can also be traced, quite apart from the devices adopted to safeguard the case which we briefly described in our opening lines. In the XVIIth century and early years of the XVIIIth, rings—called dustproof bands—were fitted between the plates (that is to say, between the two metal plates which support the whole movement). In about 1750, this dustproof band covered the whole movement, including the cock and was given the name of "movement cap or cover"[1].

To-day, these primitive attempts have only a purely relative value, because watch-case manufacture has undergone such revolutionary changes, that factors considered important in those days, now have no significance whatsoever.

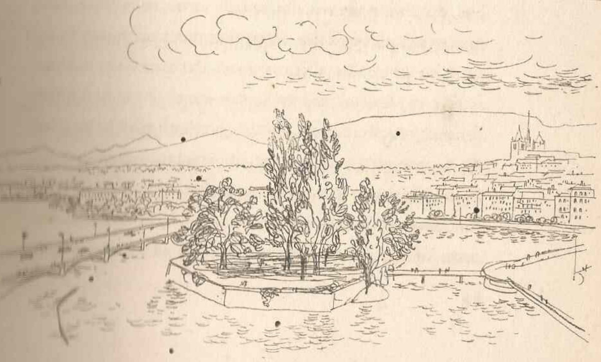
The winding crown is the watch's most vulnerable part, because it is through this organ that dust and water might easily penetrate into the movement. Nevertheless, the case itself, composed of the back, case-band, bezel and glass, has always preoccupied research workers who have done all in their power to render the combined mounting of these different parts really waterproof.

For example, in 1891, François Borgel, a Genevan specialist in this field, conceived the idea of eliminating the

dome and back of the case. He took out a patent for a case made in a single piece with a threaded edge for screwing directly on to the movement. This device certainly afforded better protection, but the crux of the problem, namely, the winding stem, remained unsolved.

In effect, up to 1926, no one had ever produced a watch really impervious to water, because no one had approached the heart of the difficulty, either because the question seemed insoluble, or because no one realized its importance.

The pioneer in this field, the man who first grasped the full significance of this point and who, by sheer determination and undeviating purposefulness, succeeded in finding the most happy solution to the problem, is Mr. H.

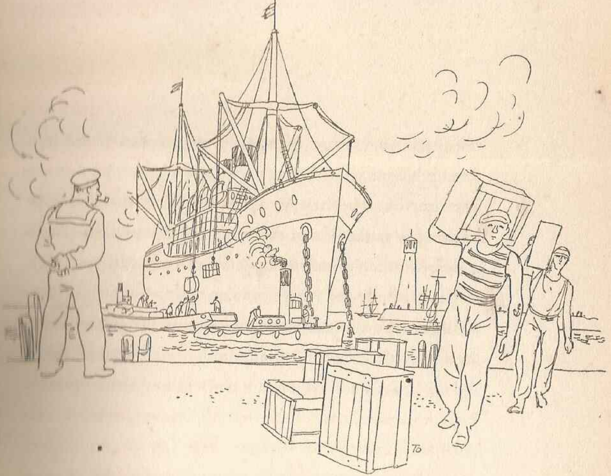


Wilsdorf, Governing Director of the Rolex Watch Co. Ltd. in Geneva.

Perhaps it was because Mr. Wilsdorf is not himself a technician that he dared to confront the difficulty. However it may be, not only has he found the solution, but his answer to the riddle proved the best from the very outset, because his device requires no plastic or synthetic materials whatsoever.

Thanks to his perseverance, Mr. Wilsdorf has achieved a most remarkable result: the watch universally known today under the name of "Rolex-Oyster" (a self-explanatory name, if one pauses to think of the little shell-fish with its hermetic, protective shell). One must go back to the years 1926 and 1927 in order to appreciate the full worth of this discovery. In those days, the idea of a watch impermeable to water appeared quite utopian and without future to the majority of manufacturers and technicians who did not, in fact, see its necessity or utility. At trade congresses and meetings, the "waterproof" watch was held to scorn by specialists and a discussion of the problem provoked sarcasm rather than useful and objective arguments.

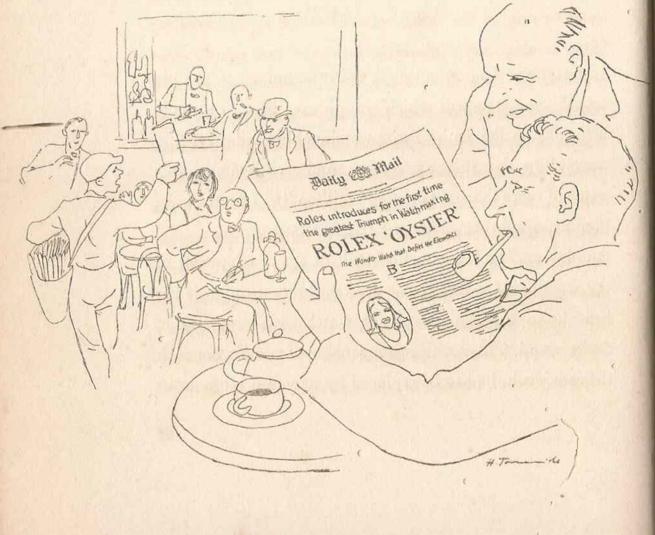
However, Mr. Wilsdorf persevered and by means of an international advertising campaign caused his watch to be



appreciated all over the world. Other manufacturers had to follow the movement which was to exercise an enormous influence on the entire Swiss watchmaking industry. Statistics show that since 1927 waterproof wrist watches, to a value of more than one thousand million Swiss francs, have been exported throughout the five Continents.

Another and no less tangible result of the development of the waterproof watch is the profound modification it has brought to the manufacture of watch cases generally in Switzerland. Old machinery, incapable of turning out such delicate work, had to be replaced by new and more accurate machines. Millions of francs were invested in this modern technique and the machine industry entered a new era of prosperity. The Swiss watch-case industry itself regained its position as the first in the world and this at a time when it seemed to have most serious foreign competition to face. But, to return to the years 1926 and 1927!

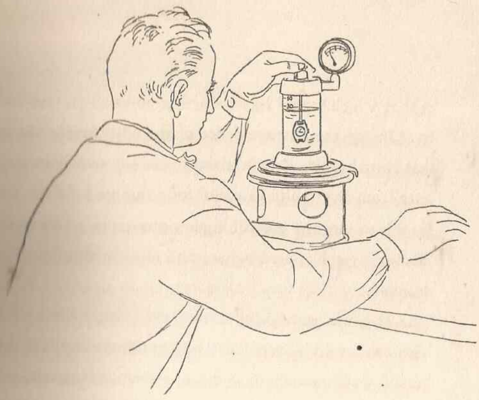
Acting on his unshakable conviction of the future which lay before the "Oyster" waterproof watch, Mr. Wilsdorf did not hesitate to invest many tens of thousands of pounds in a world-wide publicity campaign in order to launch his new invention. His faith was not belied and success came swiftly. Other manufacturers were now obliged to find a solution to the problem, for concrete proof was to hand testifying to the fact that the waterproof watch did meet a very real need in the modern world. Rolex's had sought, found and patented the ideal solution; their waterproof watch excluded the use of plastic materials. Many other methods were thought of and tried. First, a ring of rubber was pressed between the bezel and the case-band, and another ring of the same material fitted to the winding stem. It was soon discovered, however, that rubber dries up little by little, and is not the ideal material for this purpose. Leather, too, was tried, but it tends to harden in course of time. Then, special kinds of liquid substances (usually oils) were used to close up the orifices of the watch. The metal was fluted to retain these substances, but in the end, the capillarity of the oils proved too great an obstacle. Finally, the idea was conceived of using divers plastic materials in the joints and at the bottom of the crown, but here again the same inconvenience remains: although a watch of this kind may be waterproof at first, this property is impermanent, because plastic materials tend to deterior-


Daily Mail
Rolex introduces for the first time
the greatest Triumph in Watchmaking
ROLEX 'OYSTER'
The Wonder Watch that Defies the Elements

ate and to disintegrate after a certain lapse of time. In comparison with all these methods, Mr. Wilsdorf's invention is characterized by its great simplicity and purely mechanical construction which, at the same time, corresponds exactly to what is required. In the second part of this booklet, readers who are interested in this device will find it described in as simple terms as possible and with the aid of illustrations.

Here we shall merely say that the crown and winding stem are the elements which retained the inventor's attention. The solution found still makes it necessary to unscrew the crown, which controls the waterproof mechanism, in order to operate winding. This is not a disadvantage, provided that the crown is always screwed back into position. Nevertheless, in order to obtain a still more practical solution, a few years later Rolex's again turned to the principle of automatic winding and found an answer which proved to be a happy complement to the waterproof qualities of the "Oyster", one discovery leading to the other.

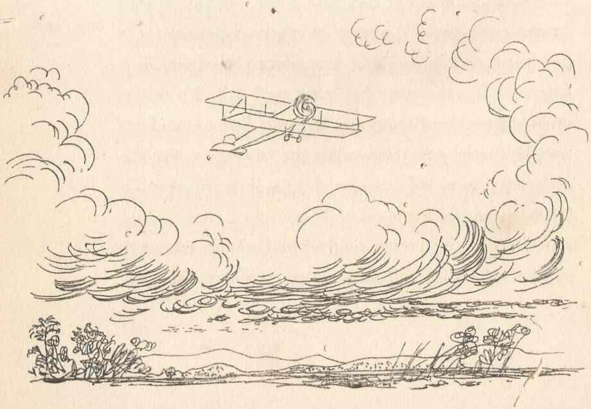
It is an indisputable fact that the Rolex "Perpetual" could never have attained its extraordinary precision, had not the waterproof case been invented.



In order to verify the degree of waterproofness of a watch, the case itself is plunged in water and if, after the operation, no trace of humidity is found inside, one concludes that it is waterproof. In point of fact, such a test is not in the least conclusive, because this very summary experiment can supply no definite evidence that, *once the movement is fitted inside the case*, the latter will still be waterproof. The Rolex Factory has therefore designed and patented a special apparatus, called the "Rapid", which can detect the presence of drops weighing as little as 0,05 milligrammes and which allows for the immediate control of the waterproof qualities of the finished watch. When the watch is immersed in this apparatus a vacuum is created equivalent to that which would be obtained at 30 to 45 ft. under water. One of the characteristics of the appliance is the fact that it makes the air contained inside the watch escape at once from any faulty case and form minute bubbles.

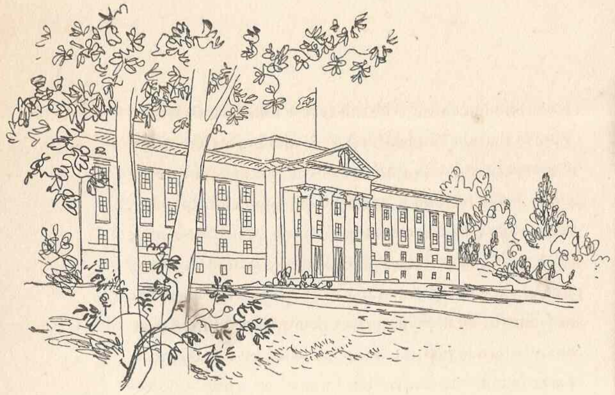
By this means, the perfect imperviousness to water of each "Rolex" watch is ascertained, and any defect immediately detected.

The absolute waterproofness of the "Rolex-Oyster" has been confirmed by trials at the Kew Observatory. A number of watches chosen haphazard from among the usual serial production were taken and plunged into water for a period of three weeks. Every watch submitted to this trial showed little or no variation.



However, not content with this severe test, Rolex's wished to prove that the "Rolex-Oyster" is also impervious to air. This experiment was carried out with an apparatus composed of two recipients, one containing gas and the other, hermetically closed, containing a "Rolex-Oyster" case inside which a piece of sensitized paper had been placed. A second piece of the same paper was placed *next* to the case. The gas from the first recipient was then pumped into the second, the inside pressure being indicated by a manometer. It was found that the sensitized paper inside the "Oyster" case showed no reaction whatsoever to the gas, even under pressure, whereas the second sensitized paper was immediately coloured. These scientific trials having proved entirely successful, the "Rolex-Oyster" was submitted to other, more practical tests, equally severe, which caused a sensation at the time. In September 1927, Miss Gleitze swam the Channel, and "Rolex-Oyster" enabled her to keep constant count of the hours throughout her ordeal. She was one of the first to praise the trustworthy performance of the "Rolex-Oyster" and indeed, who was better fitted than she to understand its worth!

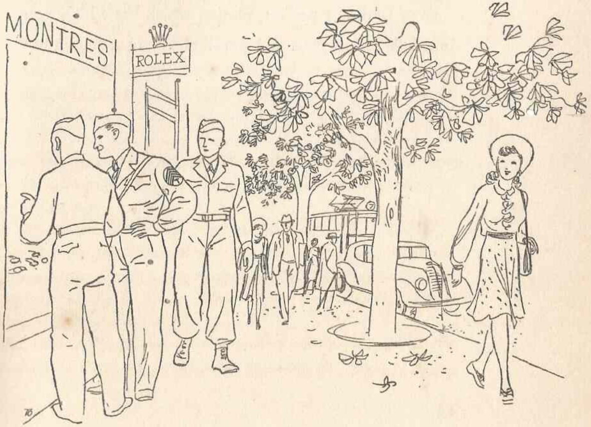
In yet another field of sport, Lt. Owen Cathcart-Jones, who carried out the remarkable London—Melbourne—London



flight, also landed after this splendid feat with a "Rolex-Oyster" he had worn throughout the journey. After 12 days of flying over 25,000 miles, the watch still marked perfect time with a deviation of only a few seconds. It had travelled through all weathers and climates (leaving England in mid-winter, it arrived in Australia in summertime); it had also been exposed to considerable variations of altitude and atmospheric pressures. Surely it may be said that this was the greatest possible proof of the superiority of Swiss horology, of which the "Rolex-Oyster" is certainly one of the most remarkable products.

Many examples such as this could be cited.

Every successful invention incites emulation, usually beneficial. Sometimes, however, a patent can be circumvented by a competitor or even merely copied. This did indeed occur as regards Mr. Wilsdorf's waterproof crown and the inventor was obliged to go to law against a certain watch-case manufacturer. After proceedings which lasted 2½ years, the Swiss Federal Court of Justice unanimously (7 judges out of 7) recognized the validity of the Wilsdorf patent. At the same time, the defendant's device was pro-



nounced a counterfeit. According to the final verdict, Rolex were awarded very high damages.

In his summing up of the case, the presiding judge recalled how, for the last hundred years, technicians had tried to solve the problem of the waterproof watch, but in vain. The term "waterproof" watch had often been employed, but without real justification, just as for centuries man had talked of distances "as the crow flies", without being able to emulate the flight of birds. Mr. Wilsdorf, the judge concluded, had the great merit of first willing to succeed and then of finding a perfect solution which has widely contributed to the progress and development of a fine industry.

TECHNICAL DESCRIPTION

There are three elements which make it difficult to render a watch absolutely hermetic and waterproof, namely:

1) the glass,
2) the closing of the case,
3) the winding-crown.

The first problem lay in the glass. After research work carried on over a number of years, Rolex's found a special material which can be exactly adapted to the bezel in such a way as absolutely to exclude condensation. Rolex's have been preparing these waterproof glasses in their Geneva workshops for the last 20 years.

The second difficulty was raised by the closing of the case. Mr. Wilsdorf's first Swiss patent for a waterproof case is dated September 21st 1926. It covers a so-called "shaped" watch case having a shaped case band with a round bezel, a back, and a casing ring. The importance of the patent lies in the manner in which these parts are assembled. The casing ring, the back and the bezel are threaded. When these parts are screwed together tightly, they each have a sharp edge which rests on the lateral face of the case-band. The components of the case, namely, the case-band, casing ring, back and bezel, are thus clamped together. This method of assembling the case has the advantage of rendering the joints permanently impervious to water and dust.

It goes without saying, that a construction such as this is only possible if every part is tooled with the utmost precision, and if the different faces of each part are exactly parallel. Rolex watch cases are manufactured by a process which allows for an extraordinarily small margin of tolerance.

The third difficulty lay in the winding crown. Mr. Wilsdorf's patent for a waterproof crown is dated October 18th 1926.

Here, the problem resided in the fact that the crown had to block hermetically the aperture formed by the winding stem and, at the same time, to allow for unscrewing when the watch was to be wound or set. A delicate problem indeed, if one was determined to ensure that not the slightest particle of water should be able to enter the movement, even when the phenomenon of aspiration (or suction) occurred inside the case as a result of variations in pressure and even of temperature.

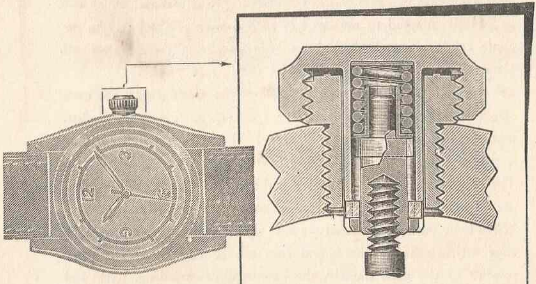


Fig. 1
Crown locked and waterproof

Mr. Wilsdorf's invention is remarkable for its simplicity of design and the perfect solution it gives to the difficulty. As will be seen from the illustrations, the winding crown includes a sleeve adjusted in a tube fixed in the case-band This tube is threaded on the outside and on this the winding crown is screwed. The sleeve is designed to allow for the penetration of one end of the winding stem, but the surface of its inner end is narrowed down and shows a square transverse section.

As will be seen from the accompanying illustration, winding crown

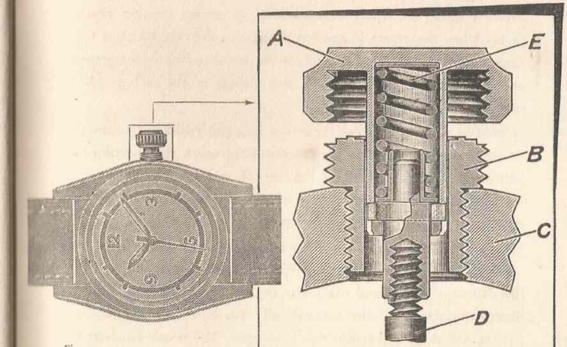


Fig. 2
Crown unscrewed for winding

A Head of crown B Case tube C Case D Stem E Spring

A includes a sleeve adjusted in a tube B which is screwed into case-band C. Part of this tube is threaded to receive winding crown D. The extremity of the sleeve is fitted with a piece of steel bearing two tenons one opposite the other.

This arrangement serves two purposes. Firstly, it prevents the piece of steel in the sleeve from turning and, secondly, the two tenons serve to engage the small sleeve which is split axially on both sides. Into the sleeve is also screwed the winding stem. The inner end of this small sleeve terminates in a pivot and a collet. Between the collet and the bottom of the crown is a spiral spring which ensures the engaging of the parts.

Figure 1 shows the whole mechanism in its normal position, that is to say when the crown is screwed down into the case which is thus hermetically sealed. In this position the spiral spring is compressed and the tenons, being free, do not engage in the corresponding cavities.

It must be noted that, when the crown is in this position, two metallic surfaces are pressed tightly one against the other, thus assuring the permanent, hermetic sealing of the case. It is impossible for foreign bodies to penetrate within the case when it is thus closed and neither dust nor water can reach the movement.

In order to wind the watch, one need only unscrew the crown. As soon as the crown is disengaged from the end of the tube it automatically springs up and out under the action of the spiral spring. Simultaneously, the collet automatically fits into the corresponding cavities and the whole mechanism is engaged. The watch can now be wound in the ordinary way and, by pulling out the crown as in any other watch, hand setting can be operated.

In the vertical section shown in Figure 2, A is the crown, B the tube bearing one thread for the crown and another thread for screwing into case C. D is the winding stem and E the spiral spring.

The first waterproof crowns of this type were large and rather clumsy. In the course of years of research, improvements and patents have been applied to the device and to-day the small, elegant Rolex crowns enclose a minute, but highly resistant mechanism of remarkable precision.

1000 numbered copies
of the Rolex Vade Mecum have been printed.

No. 217